# NOTE ON A REVERSED ACTION OF THE CHORDA TYMPANI ON SALIVARY SECRETION



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# NOTE ON A REVERSED ACTION OF THE CHORDA TYMPANI ON SALIVARY SECRETION.

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(*From the Wellcome Physiological Research Laboratories.*)

In conjunction with C. T. Symons, we[1] recently described a reversed action of the vagus, such that the cat's heart was accelerated during, and inhibited between the periods of stimulation. Langley[2] described an apparently analogous change of response of the bladder to stimulation of the pelvic nerve after curari. We obtained the vagus reversal after nicotine, and other alkaloids (curari, hordenine methiodide, tropine) which appear to act mainly on the same structures. At the time of our publication we had observed indications of an analogous effect with the chorda tympani after certain doses of tropine and nicotine, the flow of saliva produced by stimulation of the nerve being more rapid after than during the stimulus, and being retarded on renewing the stimulation while this rapid after-secretion was in progress. It was necessary carefully to exclude merely mechanical error, as the rather weak retardation we had at that time observed might have been due to slight obstruction caused by imperceptible traction on the duct in lifting the nerve for stimulation, or by escape of current on to the surrounding muscles. We continued our experiments, making careful controls to exclude these sources of error, and have obtained results, both in the cat and dog, which can only be interpreted as analogous to the reversed effects of the vagus and pelvic nerve. Our best results were obtained in the course of experiments on the action of cytisine, the alkaloid of laburnum seeds, which, as we shall show elsewhere, has an action in almost all respects like that of nicotine. Our better

[1] *Proc. Physiol. Soc.* p. xiii, 1909, this *Journal*, xxxix.; and this *Journal*, xli. p. 1. 1910.

[2] *Proc. Physiol. Soc.* p. lxii, 1910, this *Journal*, xl.

success is probably due to the fact that we are now more familiar with the conditions favourable to the observation of the effect, rather than to any superiority of cytisine over the other alkaloids for its production. Langley[1] showed, in 1890, that, after incompletely paralytic doses of nicotine, the secretion produced by stimulation of the chorda may be mainly a prolonged after-effect. The only new point, therefore, is the reduction of the rate of this after-secretion by renewed stimulation. The following is the complete record of one of the experiments on the cat. It may be noted that there is indication of a double effect of the chorda even before administration of the alkaloid, in that the rate of secretion falls off towards the end of a prolonged period of stimulation, being accelerated again as soon as the stimulation ceases. According to Langley, such a prolonged after-secretion, apart from the effect of nicotine, more frequently occurs when the duct and hilus have been exposed. It will be seen, however, in our record, that renewed stimulation of the chorda, even after 1 mgm. of cytisine, causes a slight acceleration of this after-flow. It is not until 3 mgms. have been given that the secreto-inhibitor effect appears.

*Cat.* 2·2 kilos. Chloroform. Then ether + a little chloroform throughout the experiment. Tracheotomy. Cannulæ in left carotid artery and right femoral vein, through which all injections were made. Cannula in right Wharton's duct connected to small bore glass tube on millimetre scale. Chorda-lingual cut and prepared for stimulation. Secretion recorded in mms. at intervals of 10″, the numbers in black type show the periods during which the chorda tympani was stimulated. Secondary coil at 18—16 cm.

11.10. 0, 0, 0, **20**, **24**, **11**, **7**, 11, 17, 16, 13, 13, 14, 11, 8, 8, 7, 6, 4, 3, 3, 2, 2 etc.

11.16. 0, 0, 0, 3*, 32, 15, 3, 1, 0, 0, 0, **17**, **7**, **2**, 10, 15, 13, **15**, 15, 14, 11, 10, 8, 7, 7, 3†, 10, 20, 6, 4, 1, 1, stops.

* Inject 1 mgm. cytisine. † Inject 2 mgms. cytisine.

11.26. 0, 0, 0, **0**, **0**, **0·5**, 8·5, 17, 14, 12, **3**, **2**, **3**, 18, 22, 14, 11, **8**, **2**, **1·5**, **3·5**, **6**, 21, 23, 18, 11, 9, 6, 6, 4, 4, 2, 2, 2, 0, 0, stops.

11.35. 0, 0, 0, 0*, 0, 0, **0**, **0**, **0**, **0**, 1·5, 8·5, 7, **5**, **2**, **1·5**, **1·5**, 9, 16, 12, **3·5**, **1**, **2**, **3·5**, 13, 15, 10, 6, 5, **2**, **0·5**, **1·5**, **4**, 11, 14, 9, **2·5**, **1**, **1·5**, 8, 9, 6, 4, 2, 1, 1, 0·5, 0, stops.

* Inject 2 mgms. cytisine.

The figure shows diagrammatically the effects of the series of three periods of stimulation beginning at 11.26 a.m. in the above record. A similar, though somewhat weaker effect was observed in a dog, under

[1] This *Journal*, XI. p. 147. 1890.

morphia and A.C.E., after 18 mgms. of cytisine. It will be sufficient to quote one line of the record subsequent to this. A tube of larger bore was used for recording the flow in the dog.

*Dog.* After 18 mgms. of cytisine. Secondary coil at 20 cm.

Salivary secretion:

0, 0, 0, **0**, **5**, **4**, **3**, 8, 14, 15, 9, 9, 7, **2**, **3**, **3**, 9, 13, 12, 12, 11, 7, 8 etc.

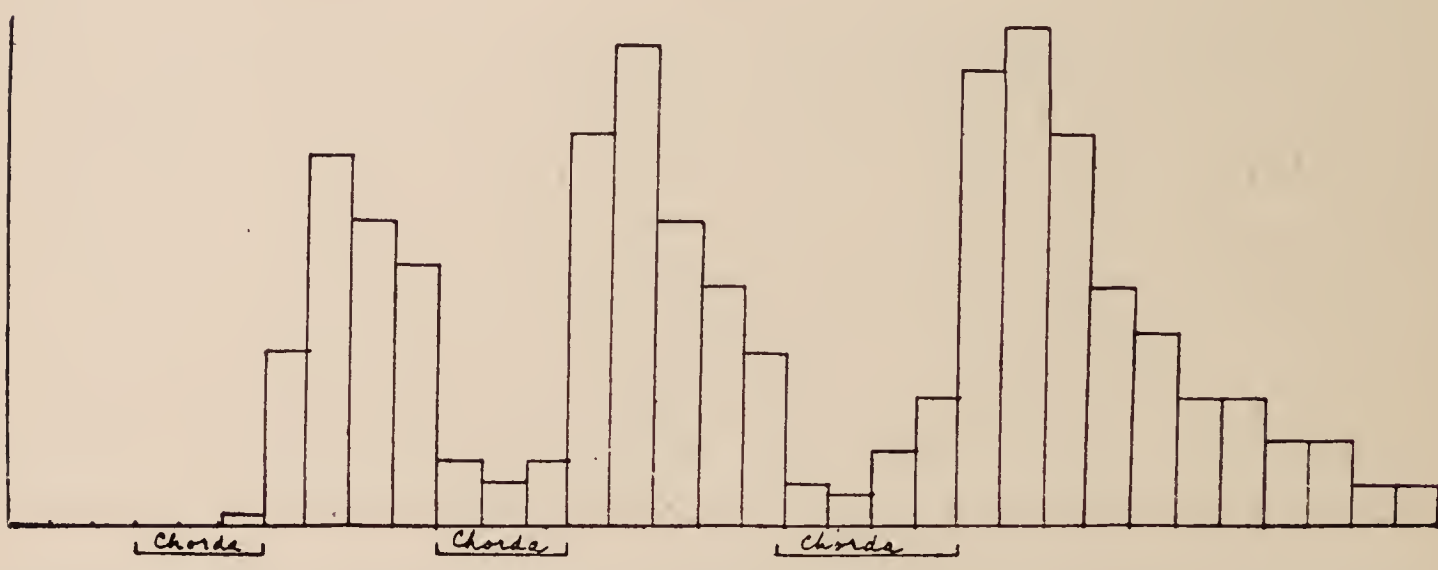


Diagram showing the effect of three stimulations of the chorda tympani in a cat after 3 mgms. of cytisine. Rectangular areas represent volumes of secretion in 10″ intervals.

A vaso-constrictor effect of the chorda tympani after injection of nitrites has been described by Fröhlich and Loewi[1], but denied by Bayliss[2]; but, so far as we can discover, it has not been shown previously to have a secreto-inhibitor action under certain conditions. The effect is obviously analogous to those with the vagus and pelvic nerve referred to above, and its nature needs no separate discussion.

[1] *Zentrlb. f. Physiol.* xx. p. 229. 1906; and *Arch. f. exp. Path. u. Pharm.* LIX. p. 64. 1908.

[2] This *Journal*, XXXVII. p. 256. 1908.